Novel approaches to targeting gliomas at the leading/cutting edge

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Abstract

Despite decades of clinical trials and surgical advances, the most common high-grade glioma, glioblastoma (GBM), remains an incurable disease with a dismal prognosis. Because of its infiltrative nature, GBM almost always recurs at the margin, or leading edge, where tumor cells invade the surrounding brain parenchyma. This region of GBMs is unique, or heterogeneous, with its own microenvironment that is different from the tumor bulk or core. The GBM microenvironment at the margin contains immunosuppressive constituents as well as invasive and therapy-resistant tumor cells that are difficult to treat. In addition, the blood-brain barrier remains essentially intact at the infiltrative margin of tumors; further limiting the effectiveness of therapies. The invasive margin creates the greatest challenge for neurosurgeons when managing these tumors. The current paradigm of resection of GBM tumors mainly focuses on resection of the contrast-enhancing component of tumors, while GBMs extend well beyond the contrast enhancement. The infiltrative margin represents a unique challenge and opportunity for solutions that may overcome current limitations in tumor treatments. In this review of the current literature, the authors discuss the current and developing advances focused on the detection and treatment of GBM at the infiltrative margin and how this could impact patient outcomes.

Keywords: blood-brain barrier; fluorescence-guided surgery; glioma surgery; immunotherapy; intraoperative technology; oncology; tumor.

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